Marine Aviation

Flying Leathernecks

Marine Aviation

The Airpower in the Marine Air-Ground Team . . .

Marine forces are employed as an integrated air-ground combat system. Not merely joined at the top when the time comes to fight, they train as an integrated team full time. The aviation element is critical to the success of the force as a naval expeditionary team.

The history of Marine aviation since its inception in 1912 is a story of heroism, skill, dedication, and of a continuous effort to develop better ways for air and ground forces to operate together. Marines pioneered:

- *Close air support,*
- *Heliborne operations,*
- *Moveable expeditionary air fields,*
- *Vertical/Short Takeoff and Landing (VSTOL) jets,*
- *Expeditionary maintenance organizations, and*
- *Expeditionary, interoperable air command and control systems*

. . . all with the goal of putting aircraft wherever they can best support the integrated air-ground combat effort.

Marines hug the sand on a shell-torn Pacific island during World War II as a "flying leatherneck" overhead rolls in to help dislodge Japanese defenders.

. . . and the "Green Side" of Naval Aviation

Since the very beginning in 1912, Marine aviation has also been an integral element of naval aviation. Marine aviators attend the same flight training, fly the same aircraft, use the same standard procedures, and proudly wear the same distinguishing wings as their Navy counterparts.

Unique among the Nation's aviation forces, Marine squadrons can conduct sustained operations both at sea and ashore.

What distinguishes the Marine naval aviator from a Navy naval aviator is his training and orientation as a Marine. All Marine aviators are trained in combined arms operations before they go to flight school. Throughout their careers, they remain part of an integrated combined arms warfighting team.

Because they are fundamentally naval yet capable of operating from shore, Marine squadrons are uniquely able to support naval operations by air, land, and sea. They can:

- *Conduct naval air operations from shore,*
- *Host Navy squadrons ashore, and*
- *Deploy aboard ships*

. . . which makes Marine aviation a unique and highly versatile capability in the Nation's arsenal of defense.

In 1912, Marine 1st Lt Alfred Cunningham became the 5th U.S. airman designated as a naval aviator.

Heavy Firepower When and Where It's Needed

The Genesis of Close Air Support

As pioneers of close air support, Marines developed the techniques of dive bombing to achieve the pinpoint accuracy required when working close to friendly troops.

Nicaragua, July 1927

A garrison of 38 Marines was besieged by a force of 500 rebels. Led by Major "Rusty" Rowell, five Marine DH-4B scout biplanes rolled in to strafe and bomb the attackers. Within minutes, 56 rebels were killed and the rest fled in panic. Close air support proved itself for the first time in combat.

A Marine DH-4B pulls out of a bombing run on rebel positions, Nicaragua, 1927.

The Philippine Islands, February, 1944

During World War II, Marines developed the use of forward air controllers — aviators assigned to the forward ground units to actually control the aircraft during their bombing runs.

When first introduced to this unorthodox use of air power by Marine squadrons in the Philippines in 1944, Army units were initially skeptical but quickly became highly enthusiastic.

> ***"I have never seen such able, close and accurate close support as the Marine flyers are giving us."***
>
> *Brigadier General Chase,*
> *1st Cavalry Division, U.S. Army*

Marine ground forces expect and depend on that type of air support — sometimes within yards of the front lines, sometimes miles away, but always where they need it, when they need it.

Marine F4-U Corsairs prepare to attack Japanese positions during the Pacific campaign in World War II, 1944.

Korea, December 1950

With the surprise entry of Communist China into the Korean War, the 1st Marine Division found itself encircled by eight Chinese divisions at the Chosin Reservoir. Fighting their way out of the trap in sub-zero temperatures — "attacking in another direction" as the division commander put it — the Marines relied heavily on close air support. Marine aircraft flew at treetop level to strafe, rocket, and bomb the attackers, and the combined Marine air-ground team inflicted 30,000 casualties. Afterward, a Chinese General attributed their defeat in no small measure to the deadly effectiveness of the dedicated Marine close air support.

Marine Corsair delivers napalm against Chinese Communist position blocking the escape route from the Chosin Reservoir, December 6, 1950.

The effectiveness of integrated air-ground operations was amply demonstrated during Desert Storm.

Kuwait, February 1991

During Operation Desert Storm, Marine columns attacking through breaches in the Iraqi defenses were threatened by massed artillery. LtGen Boomer, the commanding general of the Marine air-ground expeditionary force, immediately turned to his air squadrons for the solution.

> ***"The biggest threat we faced getting through the breach was the Iraqi artillery. We couldn't reach it with our guns; it could only be eliminated by air strikes. Our Marine attack and fighter/attack squadrons did a superb job in neutralizing it."***
>
> *LtGen Walter E. Boomer, CG*
> *I Marine Expeditionary Force*

Later, after intensive battlefield preparation by all components of coalition air power, Iraqi targets had become elusive and widely scattered; Marines quickly developed impromptu tactics to locate and destroy them using airborne forward air controllers flying the two-seat F/A-18D Hornet. Marine All-Weather Fighter Attack Squadron 121, equipped with these versatile aircraft, had been deployed to the Persian Gulf for just that purpose and proved highly effective.

Forward air controller in a two-seat Marine F/A-18D pinpoints targets in Kuwait, February 1991. *(Courtesy of Maj H.A. Stockwell.)*

Crucial Battlefield Mobility and Sustainment

Marines Originate Heliborne Operations

With their focus on integrated air-ground operations, it was natural that Marines would pioneer the use of helicopters for assault support and logistic movement.

The development of the concept of "vertical envelopment" reflected the same boldness and innovation the Corps had used to develop amphibious doctrine during the early 1930's.

Even though the Marine Corps did not own a helicopter until 1948, Marines were already planning radical changes in the ship-to-shore movement; the initial waves would land behind the beach defenses, dropped into weak points in the enemy positions by helicopters.

Marines practice early helicopter assault tactics with HRP-1's at Quantico, Virginia in the late 1940's.

First combat tested in Korea, "vertical envelopments" allowed Marine combat troops, their equipment, and their supplies to move anywhere on the battlefield.

> ***"Marine helicopters have proven invaluable . . . They have been used for every conceivable type of mission."***
>
> *BGen Edward A. Craig, CG*
> *1st Provisional Marine Brigade*

In October 1951, during Operation Bumblebee, an infantry battalion was lifted to frontline positions by helicopter for the first time. Innovative planners had the helos return with wounded, and "Medevacs" came of age as Marine helicopters transported nearly 10,000 casualties over the course of the war.

The first wave of combat-ready Leathernecks hit a Korean hilltop from an HRS-1 Sikorsky helicopter in October 1951.

A CH-53E Super Stallion lifts a Light Armored Vehicle.
(Courtesy of Marine Corps Gazette.)

Since those first, early trials, helicopters have become the backbone of Marine tactical mobility and added a third dimension to land combat.

As early as 1955, a Marine Corps Landing Force Bulletin envisioned naval air-ground forces designed "to exploit the speed and flexibility of the helicopter for the projection of seapower deep ashore at any point on the world littoral without the necessity for direct assault on the intervening shoreline."

The Army was quick to recognize the revolutionary potential of helicopters on the modern battlefield and took the lead in the development of helicopter gunships.

Among the many innovations in helicopter technology developed by the Marines is the largest helicopter in the world outside the Commonwealth of Independent States — the CH-53E Super Stallion. Introduced in 1980, this powerful machine is designed for extended deployments aboard ship and is capable of refueling in-flight from Marine KC-130 tankers.

Marines board a CH-46 Sea Knight. This versatile medium-lift workhourse — the backbone of Marine tactical mobility — was introduced almost 30 years ago and is nearing the end of its service life.

Today, the Corps hard-won expertise in vertical assault together with fixed-wing tactical air serves as an integral part of our unique air-ground team. Helicopters not only support, they fight.

Kuwait, February 1991

The I Marine Expeditionary Force advanced into Kuwait as dense clouds of black oil well smoke turned day into night. When the Marines encountered a heavy Iraqi armored division, Lieutenant Colonel Mike Kurth used his night-vision equipped UH-1N Huey to lead flights of AH-1W Cobra gunships into attack positions through near-zero visibility. Forced by the smoke to engage the Iraqis at point-blank range, Kurth hovered to designate targets for the Cobra's anti-armor Hellfire missiles, leading flight after flight for ten hours. LtCol Kurth was awarded the Navy Cross for heroism after a battle in which 70 Iraqi tanks were destroyed.

A CH-53 Sea Stallion refuels from a Marine KC-130 Hercules. CH-53E's have played a vital role in a wide range of operations, including the rescue of non-combatants from the American embassy in Somalia in 1991.

An AH-1W Cobra from HMLA-369 fires rockets at Iraqi targets during the recapture of Kuwait.

Expeditionary Airfields

Operating Where No One Else Can

Henderson Field on Guadalcanal in 1942, early forerunner of Marine expeditionary airfields.

A Marine EA6B, weighing 20 tons and landing at a speed over 120 miles per hour, slams to a stop in a few hundred feet by catching an arresting cable. Marines have developed portable arresting gear systems that can be installed in a few hours.

With their extensive experience in shipboard operations, Marine pilots are accustomed to landing in close quarters. Armed with naval landing techniques and sturdy naval aircraft, they have continually sought new ways to conduct sustained flight operations from expeditionary shore bases, up front where the ground forces need them most.

As a result of these efforts, the Marine Corps has pioneered the development of moveable expeditionary airfields and today maintains the Nation's only capability of this nature.

On Guadalcanal in 1942, the solution was a 3,800-foot expeditionary airfield built from a captured Japanese airstrip and repaired and extended through the saw-toothed jungle grass by Marine engineers and Seabees.

When high performance jets replaced propeller-driven aircraft, the need for longer runways seemed to preclude basing attack aircraft close to the ground forces. The Marines came up with an ingenious solution — essentially a moveable carrier deck that could be rapidly constructed ashore.

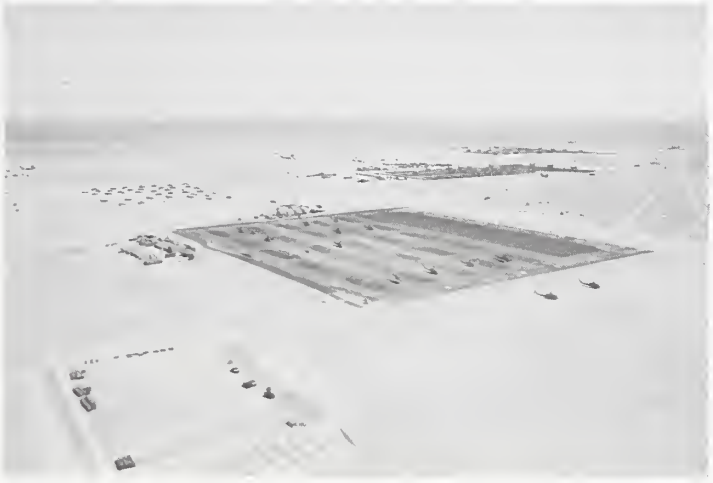
Developed in the 1960's, these expeditionary facilities were called Short Airfields for Tactical Support (SATS). They included a short runway, a catapult for launching aircraft, and an arresting cable to "trap" them on landing. In 1965, during Vietnam, Marines installed an operational SATS field at Chu Lai in 25 days.

Today the Marine Corps has come full circle. In light of technological advances, 3,800 foot expeditionary air fields without catapults are once again sufficient for conventional Marine fixed-wing aircraft.

Today's expeditionary airfields (EAF) provide a landing surface of aluminum matting, portable lighting, and arresting gear. Marine planners have developed innovative concepts and systems to make each of these elements as light and transportable as possible. They are working on a new portable arresting gear designed to be installed in four hours and capable of arresting tactical jets on any suitable hard surface, such as a highway.

The elements of an EAF have been organized into packages that can be mixed and matched as necessary to meet the requirements of the tactical situation and to take advantage of existing roads and runway surfaces.

During Operation Desert Shield, Marine matting and equipment were used to expand existing Saudi facilities for all coalition air forces and later to construct a completely new air facility in the desert, code-named Lonesome Dove.



During Operation Desert Storm, Marines constructed an austere expeditionary airfield called "Lonesome Dove" (above) in the Saudi Arabian desert in a matter of days.

Marines from MWSS-271 lay aluminum matting for an expeditionary airfield at Tanajib, Saudi Arabia, 1991.

Vertical/Short Takeoff and Landing

Marines Push the Limits of Expeditionary Basing

Quick to recognize the versatility and utility of vertical/short takeoff and landing (VSTOL) aircraft, the Corps adapted an earlier British design to field the AV-8A Harrier in 1972. With these unique "jump jets", Marines expanded the basing options for naval tactical aircraft to include amphibious ships, parking lot-size landing pads, roads, and damaged runways that are unusable by conventional jets.

The original AV-8A design traded range and payload for its vertical takeoff capability, but Marines continued to push the potential of the aircraft and developed a second generation — the AV-8B Harrier II. Standard equipment in all Marine VSTOL squadrons today, the Harrier II not only takes off and lands vertically, but also matches the range and payload of previous conventional light attack aircraft.

An AV-8B takes off from a road. *(Courtesy of Marine Corps Gazette.)*

Used for the first time in combat during Desert Storm, Marine AV-8B's demonstrated their remarkable versatility and responsiveness, operating from amphibious ships in the Persian Gulf and austere forward facilities ashore, including an unimproved air strip only 35 miles from the front lines. With their close proximity to the ground forces, the Harriers responded to requests for immediate air support in less than ten minutes.

The Persian Gulf, February 1991

On board the Nassau (LHA-4), Marine AV-8B Harriers became the first American VSTOL jets to fly combat missions from Navy amphibious ships. In seven days, the "Bumblebees" of Marine Attack Squadron 331 flew 242 missions — 57 missions in one day alone.

AV-8B Harriers prepare for take off from USS Wasp, an Amphibious Assault Ship (LHD), namesake of a carrier that was sunk during the battle for Guadalcanal. *(Courtesy of Marine Corps Gazette.)*

Expeditionary Aircraft Maintenance and Ground Support

The Key to Sustainment

To conduct sustained flight operations . . . around the clock, day after day, in combat . . . requires more than just a useable airfield. Aircraft have to be repaired and maintained, and someone has to provide airfield services such as refueling, weather services, material handling, motor transport, engineer support, and emergency personnel to handle crash, firefighting, and rescue.

These tasks are often further complicated by the adverse climates and austere locations where Marines have to operate.

To meet the challenge, Marine aviation has developed unique, versatile organizations and equipment.

The Marine Aircraft Group is a composite organization that includes squadrons of several types of aircraft clustered around a Marine Aviation Logistics Squadron (MALS). This logistics squadron provides "intermediate level" maintenance for aircraft which is not available in tactical squadrons.

A Marine jet engine repair technician from MALS-32 works on an engine from an AV-8B Harrier.

The MALS gives the Marine Aircraft Group exceptional versatility. Aircraft squadrons of different types can be added or subtracted from the organization depending on the mission and situation.

The MALS is fully deployable. Its people, tools, spare parts, and shelters can be transported to the theater of operations via amphibious shipping, air lift, or a unique aviation support ship called a TAVB. Intermediate level maintenance support can be provided from the TAVB without off-load to a shore base.

Marines have also developed deployable expeditionary organizations to perform the support functions needed to operate an airfield. Known as Marine Wing Support Squadrons, these versatile organizations can be task-organized to meet the needs of the situation.

Kuwait International Airport, February 1991. Marines from MWSS-271 and MACG-28 reopened the airport for flight operations immediately after it was recaptured from Iraqi forces.

TAVB-4 (SS Curtiss) docked at the Port of Jubail, Saudi Arabia, January 1991. A TAVB is an aviation support ship which is uniquely configured to carry a Marine Aviation Logistics Squadron.

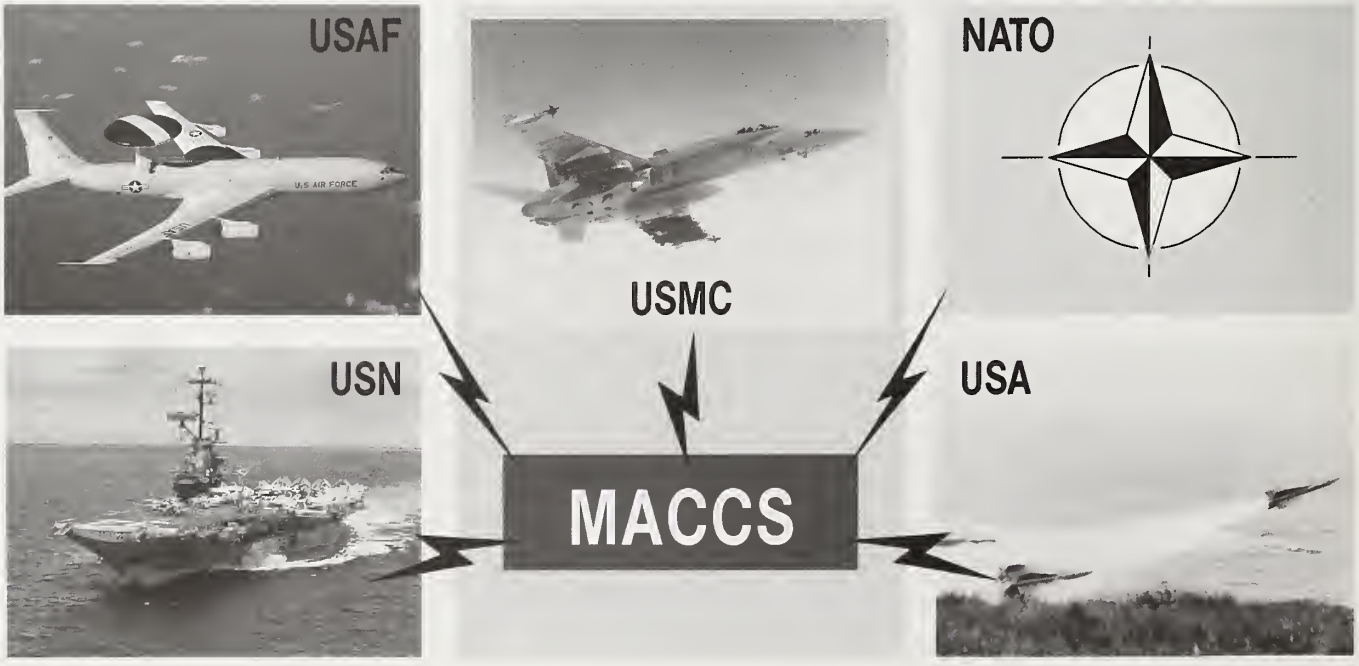
The Nerve Center of the System

Expeditionary Marine Air Command and Control

Expeditionary aircraft, expeditionary airfields, expeditionary maintenance organizations, and naval aviators dedicated to supporting expeditionary ground forces — all of these are required for an air-ground combat system, but they are not enough. The MAGTF commander also has to be able to pull it all together into a single integrated combat effort, and that requires expeditionary air command and control.

The Marine Air Command and Control System (MACCS), exploiting the potential of modern digital technology, provides the MAGTF with a transportable, modular system of communications, computers, radars, and missiles. This system allows the MAGTF commander to orchestrate aviation command and control and an integrated air defense system (fighter aircraft, HAWK and Stinger missiles) in support of ground combat operations.

Marine Air Command and Control



The expeditionary MACCS is the final piece of the system that Marines have worked for decades to perfect. With Marine Aviation operating both at sea and ashore, our air command and control systems have been designed to be interoperable with the other services.

In Vietnam, the semi-automated Marine Tactical Data System installed at Monkey Mountain near Danang was the only air control system compatible with both Navy and Air Force systems. As a result, by 1969, it became "the hub of [tactical air] information management in Vietnam."

During Desert Storm, the MACCS proved highly effective providing a common link between the Air Force, Navy, and allied systems.

Inside a transportable air control van, a Marine controller scans the radar scope for enemy and friendly aircraft.

A transportable Marine Command and Control site in the desert, disguised by camouflage netting.

Operationally, Marine Aviation Provides Flexibility and Depth to Naval Aviation

Marine Squadrons Augment Carrier Air Wings . . .

Marine squadrons have a long tradition of carrier deployments — filling temporary shortages in Navy air wings and providing sea-based Marine aviation in support of Marine operations ashore for over sixty years.

Just since 1949, Marine squadrons have made 98 deployments as part of 81 carrier air wing deployments.

During the Korean conflict, Marine squadrons flying from escort carriers such as ***Sicily, Badoeng Straits, Philippine Sea, Bataan, and Bairoko*** supported shore-based squadrons and ground forces in the defense of the Pusan perimeter, the Inchon landing, and the breakout from the Chosin Reservoir.

Marine squadrons also joined Navy carrier air wings for extensive combat operations during the Vietnam conflict.

Marine aircraft taxi for takeoff aboard an escort carrier during the Korean War.

In 1986, when an additional EA-6B squadron was needed aboard ship on short notice for operations against Libya, Marines of VMAQ-2 refreshed their carrier landing skills, packed up, and deployed to sea. Along with two Marine F/A-18 squadrons already embarked aboard the carriers, they supported Air Force and Navy air strikes.

The tradition of sea-going Marine squadrons continues today, with Marine helicopters and AV-8B's aboard amphibious ships and Marine F/A-18's and EA-6B's scheduled to deploy aboard Navy carriers as integral components of the Carrier Air Wings.

A Marine F/A-18 from VMFA-323 positions on the catapult prior to launch from USS Coral Sea, 1985.
(Photo courtesy of Maj R.D. Alles.)

. . . Host Carrier Squadrons Ashore . . .

The maintenance and logistic support for Navy carrier squadrons is bolted to the ship. However, because of the commonality of supply and maintenance for most Marine and Navy aircraft, shorebased Marine squadrons can provide maintenance support for carrier aircraft.

This capability can be used to extend the range of carrier aircraft operations, provide tactical divert fields for damaged aircraft, or concentrate naval airpower ashore for surge operations.

At a critical phase of the Pacific campaign in World War II in November 1942, Navy carrier squadrons from ***Enterprise***, ***Saratoga***, and ***Wasp*** operated ashore on Guadalcanal with the support of Marine maintenance and helped defeat successive Japanese invasion fleets.

During Desert Storm, a battle-damaged Navy aircraft, unable to recover aboard its carrier, diverted ashore to be repaired by Marine ground crews.

A Navy F/A-18 identical to those flown by Marine fighter-attack squadrons prepares to land at a Marine Corps airfield to be repaired, refueled and rearmed.

Although they are naval, Marine squadrons are trained, organized, and equipped for sustained expeditionary operations ashore. This enables them to conduct naval air operations — attacking or defending ships — from shore.

During World War II, shore-based Marine squadrons supported Navy carrier operations during the battles of Midway and Guadalcanal. They were key components of a combined shore-based and carrier air campaign to wrest sea control from the Japanese in the Solomon Islands.

During Operation Desert Shield in 1990, Marine F/A-18's based in Bahrain flew continuous combat air patrols over the Persian Gulf to protect transport shipping inbound to the port of Jubail.

In short, Marine squadrons not only meet vital requirements of the Marine Air-Ground team, they provide a unique and highly cost-effective capability to the naval task force, the Joint Force Commander, and the National Command Authorities.

. . . or Conduct Naval Air Operations from Shore-bases and Expeditionary Airfields

A Marine F/A-18 armed with a variety of missiles including a HARPOON. Only Navy/Marine Corps aircraft can fire this sophisticated anti-ship missile.
(Photo courtesy of McDonnell Douglas Corporation.)

SB2U-3 dive bomber of Marine Scout Bombing Squadron 241 taking off to attack the Japanese Fleet Striking Force during the battle of Midway, June 4, 1942.

Today's Flying Leathernecks

Pulling the diverse capabilities of Marine Aviation together as a team, Marine Aircraft Groups have long organized for combat as composite groups of 80 to 100 aircraft. Each type of aircraft within the group performs a unique mission essential to the success of the entire force.

Fixed-wing groups provide heavy firepower when and where needed:

F/A-18 Hornet

- The majority of Marine close air support 24 hours a day and in bad weather
- Air-to-air fighter when necessary
- Capability to shoot anti-ship missiles and anti-radar missiles
- Tactical ground reconnaissance
- Airborne Forward Air Controller

AV-8B Harrier II

- Unmatched expeditionary basing flexibility and responsiveness for close air support
- Night attack capability
- Helicopter escort

EA-6B Prowler

- Critical radar jamming to minimize losses during heliborne operations and air strikes
- Tactical electronic reconnaissance

KC-130 Hercules

- Aerial refueling for helicopters and jets
- Transport of combat cargo and troops into the battle area
- Ground refueling for forward basing
- The ability to command and control direct air support for ground forces

Rotary-wing groups provide crucial battlefield mobility and sustainment:

- Primary troop transport during combat operations
- Augmentation to transport combat supplies and equipment

CH-46E
Sea Knight

- Primary transport of heavy weapons, equipment, and supplies
- Tactical recovery of downed aircraft, equipment, and personnel
- Support for mobile re-arming and refueling bases

CH-53E
Super Stallion

- Airborne command and control for air and ground units
- Utility combat helicopter support, including casualty evacuations and emergency resupply

UH-1N
Huey

- Close in fire support with an anti-armor capability
- Armed escort for other helicopter operations
- Terminal guidance for CAS, artillery, mortars, and naval gunfire

AH-1W
Cobra

Unique, Versatile, Highly Cost-effective

Marine Aviation is a Bargain for the Warfighting CINC, the National Command Authorities, and the Nation

Marine aviation is a national asset. It gives our national leaders a tremendously versatile capability that is highly useful every day.

Marine aviation doesn't ***just*** support Marines — its naval training, aircraft, maintenance, and supply systems make it a tremendously valuable ***swing force*** capable of operating at sea or on shore.

It's unique ability to deploy rapidly and then conduct sustained operations from austere, expeditionary airfields gives it a key role in our joint family of capabilities.

At the same time it is Marine aviation — both fixed wing and rotary wing — that makes the Marine Corps the responsive combat force that the Nation expects.

It provides a total aviation system — trained aviators, specially designed aircraft, expeditionary airfields, versatile expeditionary maintenance organizations, and integrated command and control — that is vital to the Marine Air-Ground Team.

Marine aviation supports joint forces across the full spectrum of aviation requirements.

The unique capabilities of Marine aviation did not just happen; they are the conscious result of 80 years of dedication and hard work. From close air support and vertical assault to the cutting edge of tomorrow's aviation technology, Marine aviation has been an innovative leader in the development of air power to support ground operations.

A vital element in the Marine Air-Ground team. A vital element in the Nation's arsenal of defense. Marine aviation provides the capability and versatility to meet the challenges of tomorrow's rapidly changing world.

VMFA-531
MARINES